REMARKS/ARGUMENTS

1.) Allowable Subject Matter

The Applicant gratefully acknowledges the allowance of claims 8, 12 and 13.

3.) Claim Rejections – 35 U.S.C. § 103(a)

The Examiner rejected claims 1-5 under 35 U.S.C. § 103(a) as being unpatentable over Eriksson, et al. (US 6,011,815) in view of Sridharan (US 2003/005805). The Examiner rejected claims 6 and 19 under 35 U.S.C. § 103(a) as being unpatentable over Eriksson in view of Sridharan, and further in view of Liang, et al. (US 5,550,515). The Examiner rejected claim 7 under 35 U.S.C. § 103(a) as being unpatentable over Eriksson in view of Sridharan, and further in view of Liang and Perrett, et al. (US 6,018,275). The Examiner rejected claims 9 and 10 under 35 U.S.C. § 103(a) as being unpatentable over Eriksson in view of Sridharan, and in further view of Okumura (US 6,032,277). The Examiner rejected claim 11 under 35 U.S.C. § 103(a) as being unpatentable over Eriksson in view of Sridharan, and further in view of Okumura, and Perrett. The Examiner rejected claims 14, 17 and 18 under 35 U.S.C. § 103(a) as being unpatentable over Eriksson in view of Sridharan.

Applicant respectfully traverse the foregoing rejections. It is noted that the rejected claims each include one of the following limitations:

> said feedback circuit includes a device having a transfer function with at least one zero, *and the phase locked loop circuit has a closed loop transfer function without zeros.*

> a feedback circuit connecting said oscillator output to said reference input, wherein said feedback circuit includes a device having a transfer function with at least one zero, *and the phase locked loop circuit has a closed loop transfer function without zeros...*

> wherein said feedback circuit includes a device having a transfer function with at least one zero, *and the phase locked loop circuit has a closed loop transfer function without zeros...*

> wherein for said changing of said output signal a feedback circuit having a transfer function with at least one zero, is used, and said

receiving a periodic signal until said transmitting *said output signal involves a closed loop transfer function without zeros.*

None of the cited references disclose, teach nor suggest, alone or in combination, a phase locked loop with a zero in the transfer of the feedback path.

Eriksson describes a two-point modulation system for synthesizers, where the influence of the finite closed-loop bandwidth of the synthesizer is combated by a pre-distorted second modulation-input that drives a Delta-Sigma modulator. No zero's are present in the feedback path of the Eriksson system. Hence, Eriksson still requires a zero in the forward path for stability reasons, because the divider-chain which is driven by the Delta-Sigma modulator does not introduce a zero in the signal-transfer from VCO to the phase detector of the divider-chain.

Sidharan fails to overcome the deficiencies of Eriksson. Sridharan describes a noise shaping technique for Delta-Sigma modulator driven fractional frequency dividers. Sridharan discloses optimum noise shaping of the quantization noise of the Delta-Sigma modulator by means of placing predetermined zero's in the quantization noise transfer of the modulator. Those skilled in the art would recognize that these zero's are not a part of the signal transfer of the actual synthesizer loop (See Figure 8). The output of the Sridharan Delta-Sigma modulator (See Figure 7) <u>only</u> drives the divider-chain in the feedback path of the actual synthesizer. This implies that the average signal transfer of the divider-chain of the synthesizer does not contain any zero's (See block 13 of Figure 2). Further, the zero's shown in Figure 8 of Sridharan are the zero's of the noise-shaping part of the Delta-Sigma modulator only and are not a part of the synthesizer-transfer. Only the quantization-noise as generated by the Delta-Sigma modulator will be shaped in frequency by those zero's. The loop-stability of the synthesizer is not affected by these zero's. So, a synthesizer system with a fractional divider, which is driven by the invention of Sridharan still requires a zero in the forward path (in the loop filter) in order to become a stable system.

Liang fails to overcome the deficiencies of Eriksson and Sidharan. Liang describes a technique to oversample the phase error signal by means of phase comparison of several phase shifted versions of the divider output-signal and phase shifted versions of the reference signal. The consequence is that the overall error-signal

(which is the output signal of all charge pumps together) is updated several times per reference period, instead of one time per period for prior art loops. This implies that the loop bandwidth could be chosen larger compared to conventional loops. Liang does not disclose a means to introduce a zero in the feedback path of a synthesizer. Hence, a zero in the forward path is required for stability reasons. While Liang discloses the use of M divider chains in parallel, none of these M divider-chains has a zero in its transfer. So, no phantom-zero is present in Liang.

Perrett fails to overcome the deficiencies of Eriksson, Sidharan and Liang. Perrot describes a method to generate a transmitter signal by means of a synthesizer with a low reference frequency but still employing only a low division factor in the feedback path of the synthesizer. Perrett avoids high phase noise at the output of the synthesizer, while maintaining a large closed-loop bandwidth, hence providing a fast settling-time, which otherwise would be a problem in conventional systems. Notably, no zero's are introduced in the transfer of the feedback path of the Perret invention. Perret discloses superimposing a modulated signal onto a carrier by means of a modulator somewhere in the loop. But such modulator does not introduce a zero in the feedback path of the synthesizer.

Okumura fails to overcome the deficiencies of Eriksson and Sidharan. Okumura discloses a method of testing large, event driven, digital circuits, including oscillation functions. Okumura fails to disclose the placement of a zero in the feedback path of a synthesizer. It only describes a method for fast evaluation of large event driven digital systems, including oscillation functions.

None of the references, alone or in combination, disclose, teach nor suggest the placement of a zero in the feedback path (divider) of a synthesizer.

CONCLUSION

In view of the foregoing remarks, the Applicant believes all of the claims currently pending in the Application to be in a condition for allowance. The Applicant, therefore, respectfully requests that the Examiner issue a Notice of Allowance for all pending claims.

The Applicant requests a telephonic interview if the Examiner has any questions or requires any additional information that would further or expedite the prosecution of the Application.

Respectfully submitted,

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Michael Cameron
Registration No. 50,298

Ericsson Inc.
6300 Legacy Drive, M/S EVR 1-C-11
Plano, Texas 75024

(972) 583-4145
michael.cameron@ericsson.com